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4.—WESTERN AUSTRALIAN ORTHOTETINÆ.

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INTRODUCTION.

Since the revision of the group Orthotetinae in 1908 by Dr. G. H. Girty* and later by Dr. I. Thomas** there has been no revision of the various members of this group recorded from Western Australia. The present note reviews the generic position of two previously recorded forms and describes a recently discovered specimen.

PREVIOUS RECORDS.

Fragments of shell have been recorded under the names "*Derbyia senilis*," "*Orthotetes*," or "*Orthotetes crenistria*," and "*Streptorhynchus crenistria*." References to all these records are given in "A List of Western Australian Fossils," G.S.W.A., Bull. 36, pp. 86 and 87, and "Supplement No. 1 to "A List of Western Australian Fossils," G.S.W.A., Bull. 88, p. 46, both papers by Mr. L. Glauert. Imperfect specimens in various collections are labelled apparently indiscriminately with any of the three generic names.

As far as can be ascertained no descriptions have been published of Western Australian specimens of *Orthotetes* or *Streptorhynchus* so that confirmation or otherwise of these generic names, in the light of their restricted meaning, cannot be made. One specimen, G.S., No. 10930, is figured by Etheridge, jun., as *O. crenistria*, G.S.W.A., Bull. 58, pl. I, fig. 10, but beyond the ornamentation this specimen shows no features on which it may be identified. It seems fairly certain that all records are based on fragments of shell showing the typical ornamentation of the group, and that the only more or less complete specimens of members of this group ever found are those from Mt. Marmion, described by R. Etheridge, junior (G.S.W.A., Bull. 58, p. 35, pl. VII., fig. 1 and 2), and a series from Luluigui Station, numbers 2772 and 2773 in the collection of the University of W.A., listed by Mr. F. Chapman in the Annual Report of the Geological Survey of W.A. for 1923, p. 36. Both

* U.S.G.S. Professional Paper 58, 156, 1908.

** Mem. Geol. Survey Great Britain Palaeontology, Vol. I., Pt. 2, p. 85 1910.

these series are reviewed below. Three unrecorded specimens are in the Museum collection labelled No. Δ 57, *Orthotetes* cf. *O. semiplanus*, but as their locality "Gascoyne River, W.A." is not definitely known, their description is not included.

DESCRIPTION OF THE FOSSILS.

Genus DERBYIA Waagen (emend, Girty).

Salt Range Fossils Pal. Ind. Ser. XIII., Vol. IV., Fasc. 3, p. 591, 1884,
and U.S.G.S. Prof. Paper 58, p. 181, 1908.

Derbyia cf. *D. senilis* Phil.

Pl. V., figs. 6 and 7.

1914, *Derbya* sp. Eth. Jun. G.S.W.A. Bulletin 58, p. 35, pl. VII., figs. 1 and 2.

Etheridge remarks on the uncertainty of the generic determination of these specimens from Mt. Marmion, but later examination proves them to be undoubtedly *Derbyia*. The original of Etheridge's Pl. VII., fig. 2, has the top of the ventral umbo worn down exposing the internal structure. A median septum is visible running from the pseudodeltidium to the floor of the ventral valve, but this has been crushed into an oblique position. There is a slight thickening on each side of the pseudodeltidium, but there are no dental plates forming the camerate structure of *Orthotetes*. The specimen is an unsatisfactory one to photograph, but pl. V., fig. 6, shows the umbonal region broken and the matrix which fills the shell crossed by an oblique septum.

The dorsal valve of this specimen and the dorsal valve figured by Etheridge on pl. VII., fig. 1, both show the socket plates as lines through the exfoliating shell. The impressions of the socket plates are shown better, pl. V., fig. 7, by another more worn specimen from the same series, not figured by Etheridge.

All the specimens are more or less exfoliated, but from their general shape, they approach closest to *D. senilis* Phil.* with which they agree in having the hinge line shorter than the greatest breadth of the shell, a high area, very convex brachial valve, and the shell crossed by irregular concentric step-like crumples.

Dr. Whitehouse, Aust. Assn. Adv. Science, 1926, p. 281 and 283, mentions the "so-called *Derbyia senilis*" from the Irwin River and from the Kimberley district and, using it in comparing beds on the East and West sides of the Continent, correlates the Western Australian "Permo-Carboniferous" with the Middle Bowen of Queensland.

* *Streptorhynchus crenistria* var. *senilis*, Dav. Mon. Brit. Carb. Brach. pl. XXVII., figs. 2, 3 and 4.
Derbyia Waagen Salt Ra. Foss. Pal. Ind. Series XIII., Vol. IV., fasc. 3, p. 593.

The "*Derbyia senilis*" of the Bowen River** according to Dr. Girty's interpretation of the figures† is a *Streptorhynchus*. According to Dr. Whitehouse it is a new species of *Orthotetes*.

As the only complete specimens from Western Australia are the Mt. Marmion specimens, which are certainly *Derbyia*, the "so-called *Derbyia senilis*" ceases to be of any value in comparing the faunas of the two regions.

Specimen Nos.—Amongst a group of Geological Survey specimens bearing the number 10930.

GENUS STREPTORHYNCHUS King.

(Redefined by Girty, U.S.G.S. Prof. Paper 58, p. 164, 1908.)

Streptorhynchus luluigui, n. sp.

Pl. IV., fig. 1-7, Pl. V., figs. 1-4.

<i>Schizophoria resupinata</i> , Martin and	{	F. Chapman. List of Fossils from West
<i>Productus cora</i> d'Orb		Kimberley. Ann. Prog. Rept.
Do. do. do.	{	G.S.W.A. for 1923, p. 36.
		L. Glauert, G.S.W.A., Bull. 88, p. 46.

The specimens described below are placed in the genus *Streptorhynchus* on the following grounds:—

1. There is no median septum in the ventral valve seen in a section through the umbo (Specimen A), nor are there impressions of a median septum on any casts or partial casts of the ventral valve. (Specimens G, F and D).
2. Dental plates are absent (*see* Specimen A), but there is a thickening or ridge on each side of the delthyrium. These leave furrows on the cast, particularly marked near the hinge margin (*see* specimens E and F).
3. The dorsal valve has a well developed cardinal process (Specimen O) and strong socket plates curving round the muscular impressions (Specimens M, N and O).

They differ from the typical *Streptorhynchus* in showing little, if any, distortion of the umbo and area.

Numbers of separated valves, the ventral numbered 2773, and the dorsal, numbered 2772, were included in Mr. Chapman's list as *Schizophoria resupinata* and *Productus cora* respectively, and from this were incorporated in Mr. Glauert's supplementary list of West Australian Fossils in the column "Freney Oil Area."

A few better specimens now show the relationship of the two valves.

Description.—The united valves are biconvex or plano-convex. The ventral valve is ovate with a high umbo. The greatest width is about equal to or slightly exceeding the length. Longitudinally this valve is flat or very

** R. Eth. jun. Geol. and Pal. Qld., 1982, p. 246, pl. 12s, figs. 1-6.

† Girty, G. H., U.S.G.S., Prof. Paper 58, 1908, p. 169.

slightly convex. Transversely it may be almost flat to gently convex in the visceral region with gently sloping flanks. The convexity decreases towards the anterior margin where the valve is almost flat. Specimens which are almost flat in the visceral region, pl. IV., fig. 2b and 2c, pl. V., figs. 3 and 4, have a slightly longer hinge line and slightly wider umbonal angle than those which are convex in the visceral region, pl. IV., figs. 1b and 1c, pl. V., fig. 2 but the collection includes specimens intermediate between these two forms, see pl. IV., fig. 5, and ventral view of same specimen, pl. V., fig. 1.

The hinge line is much shorter than the greatest width of the shell. The area is high and about equally developed on either side of the pseudodeltidium, and inclined at an angle of between 120° – 130° to the plane of junction of the two valves. In several specimens the area is flat, in others it is slightly concave (compare pl. IV., fig. 1c and 2c) and almost imperceptibly twisted to one side. It is marked with vertical striations on the less worn specimens. When the specimens are worn the horizontal growth lines on the area and pseudodeltidium become more pronounced and the vertical striations are lost. The pseudodeltidium is gently tapering and slightly convex and is flanked on each side by a narrow, almost parallel sided portion representing the inner or secondary area. In none of the specimens is this well enough preserved to show its ornamentation.

A plasticine impression taken from an internal cast, Specimen G, of the ventral valve, shows the muscle impressions faintly. The adductors lie close to the central line, are elongated, very narrow and nearly parallel sided. The divaricators are elongated, deltoid and extend beyond the adductors to about one-third of the length of the valve.

The absence of median septum and dental plates and the presence of thickened ridges at the edges of the pseudodeltidium have already been pointed out.

The dorsal valve is almost circular. Usually the convexity is pronounced and the shell swollen towards the umbonal region. Several specimens show a flattening of the top portion of the dorsal valve carrying on the slope of the ventral area, but this flattening is shown by the crumpling of the rest of the shell, to be due to pressure crushing the specimen. The umbo of the dorsal valve is inconspicuous. The area is absent or rudimentary. One specimen (J) shows a minute linear flattened portion, not 1 mm. wide, on each side of the cardinal process, but this does not extend more than $\frac{2}{3}$ of the total length of the hinge line. The cardinal process is large and strong and projects almost at right angles to the plane of junction of the two valves. Its external features are not at all well shown by the specimens. It is deeply divided in the central line. One specimen (J) shows only this two-fold division into two long narrow prongs. Another (K) less deeply imbedded in matrix, but much more worn, shows a wider process with a central and two lateral grooves giving a more or less quadriradiate arrangement. This apparent difference in the two specimens is, I think, only caused by the different amount of exfoliation shown by the two. The broader one seems to be worn down, exposing part of the socket plates. On the internal surface the process is broad. On a specimen, 47 mms. in length, it is 7 mm. wide and 7 mm. long. It is undivided for about 4 mm., then divides into two rounded prongs slightly diverging and each bearing a cup-like depression on its posterior end, pl. IV., fig. 4a. Below the cardinal process the socket plates are pronounced, forming a thickened process at each side at about the level of the hinge margin, thence extending as narrow, slightly raised, diverging ridges

on the interior of the shell for about a third of the length of the shell. The muscle impressions are separated by a faint ridge represented on the casts as a long shallow depression (*see* specimens I and O).

The valves are ornamented with very regular striae, which take an outward sweep on the lateral portions of the shell. The striae commence on the umbo as fine hair-like lines, but grow in size so that at the margin they are prominent ribs, about eight to twelve in the space of 5 mm. Additional fine striae are interpolated between the primary striae. These may or may not attain the same size as the primary striae, so that they can usually be distinguished on close examination, but the general impression is that the ribbing is even and regular particularly on the dorsal valve. On casts and very much ex-foliated specimens, however, the distinction between coarser and finer ribs is seen here and there. On casts the striae stand up as very sharp ridges separated by flat interspaces about twice the width of the striae themselves. There is no concentric ornamentation, but a few crumples more or less pronounced are seen on the lateral slopes of the ventral valve. On the larger specimens two or three well marked latilaminae are seen towards the margin (specimen H., pl. V., fig. 3). On one or two specimens the ribs have a faint beaded appearance due to the regular arrangement of rows of perforations down each side of each rib. (Specimen C.)

Dimensions.	3040, L.	1 —B 5106	Largest dor- sal valve.	Largest ven- tral valve.
Length of ventral valve ...	41 mm.	...	...	51 mm.
Length of dorsal valve ...	34 mm.	...	45 mm.	...
Width	41 mm. (estimated)	...	58 mm.	abt. 52 mm.
Thickness of combined valves	19 mm.	11 mm.	...	...
Length of hinge line	24 mm.	25 mm.	...	...
Height of area	11 mm.	11 mm.	...	...
Width of pseudodeltidium at base	6-7 mm.	5 mm.	...	...

Remarks.—As noted in the description, a few of the characters seem rather variable in specimens in the present collection which comprises about fifteen specimens of each valve, but only two of the combined valves, *i.e.*, about thirty specimens in all. Further collecting may show that the forms included here under the one name may be separated into two groups—one represented by specimen L, pl. IV., fig. 1a-c, having a slightly shorter hinge line, more acute umbonal angle, slightly concave area and slightly broader deltidium, the other represented by specimen B, pl. IV., figs. 2a-d, having a longer hinge line, wider umbonal angle, flat area and narrower deltidium. There are a number of specimens in the collection intermediate between the two forms which, because of their imperfection, could not be allotted to one form rather than to the other.

S. luluigui differs from *S. pelargonatus* Schloth.* mainly in its greater size, the absence of marked median sinus, the absence of distortion of the area and absence of concentric growth lines. In external appearance *S. luluigui* is not unlike the Queensland specimens, figured and described by Etheridge as *Derbyia senilis*. Reference has already been made to the generic

* Davidson. Mon. Perm. Brach. (Pal. Soc. 1856). p. 32, pl. II., fig. 32-42.

position of these specimens. If they are *Streptorhynchus*, closer comparison with the Western Australian specimens will be necessary to state the specific differences.

O. perfidiabadensis,* a Northern Territory form, has a somewhat similar cardinal process, but differs in being a small shell with much less convex brachial valve.

Localities.—All specimens are from near the homestead at Luluigui Station (about lat. 18° 10', long. 124° 1') Kimberley division. Nos. 2772 and 2773 are labelled "highest horizon."

Specimen Nos.

$\frac{1}{5106}$ and $\frac{1}{5106}$ A, B and C.	} Geological Survey.
2772 and 2772 M, N and O	
2773 and 2773 E-H	
3040 and 3040 L	
3041 and 3041 I, J and K	
	} Department of Geology, University.

Streptorhynchus plicatilis, n. sp.

Pl. V., figs. 5a and b.

Description.—Shell longer than broad, almost flat longitudinally but slightly convex transversely. The umbo is very small, rather curiously shaped into a small peg-like structure projecting beyond the general surface of the valve. The hinge line is considerably shorter than greatest breadth of shell. The area is high, undistorted, with a broad, slightly elevated pseudodeltidium. Two strong teeth project from the cardinal margin and are produced for a short distance posteriorly on either side of the internal surface of the pseudodeltidium as low rounded ridges. The muscle scars are elongated, pear-shaped depressions extending about half the length of the shell and bounded anteriorly by irregular raised shelly ridges, one of which is considerably thickened, possibly due to injury. The shell is ornamented with broad radial ribs separated by hair-like furrows. Extra ribs are interpolated rather irregularly, sometimes two together. The ribs are crossed by innumerable fine raised lamellae, very close together, which can scarcely be seen with the unaided eye. There are a few concentric growth lines. These are scarcely noticeable on the earlier part of the shell, but become more numerous and marked towards the anterior. Here the ribs are grouped into irregular radial folds, from three to seven ribs in a fold.

Dimensions :

	mm.
Length	20
Maximum breadth	20
Length of hinge line	13
Height of area	4
Umbonal angle—about	125°.

* R. Etheridge, jun. Contrib. to Pal. of S. Aust. Suppl. to Parl. Paper, No. 55, of 1906, p. 6, pl. II., figs. 1-9, pl. V., figs. 3 and 4.

It is noteworthy that Etheridge compares this to *O. lens* White, which has since been made the type of the genus *Schuchertella*. Unfortunately the specimens cannot be found, according to a letter from Dr. Ward, who says, if they are in Adelaide, their whereabouts is unknown to him.

Remarks.—*S. plicatilis* is somewhat similar to *S. pectiniformis* Dav.* in general appearance, but differs in having less regular and less marked plications and much coarser radial striae. In shape, convexity, and dimensions, it agrees most closely with *S. lenticularis*† but differs from this in ornamentation. Judging by the illustrations *O. perfidiabadensis*,‡ Eth. jun., from the Northern Territory, may be compared with *S. plicatilis* in having fairly coarse ribbing, but it differs from *S. plicatilis* in having a more irregular ventral valve with a sinus.

Specimen No.—Geological Survey $\frac{1}{4972}$

Locality : Creek half mile West of Callytharra Spring, Wooramel River, W.A.

* 1862 Dav. Quart. Journ. Geol. Soc. Vol. XVIII., p. 30, pl. I., fig. 17.

1884 Waagen Salt. Ra. Foss. (Pal. Ind.) I., iv., 3, p. 587, pl. LV., figs. 4-11.

† 1884 Waagen Salt. Ra. Foss. (Pal. Ind.) I., iv., 3, p. 581, pl. L, fig. 8.

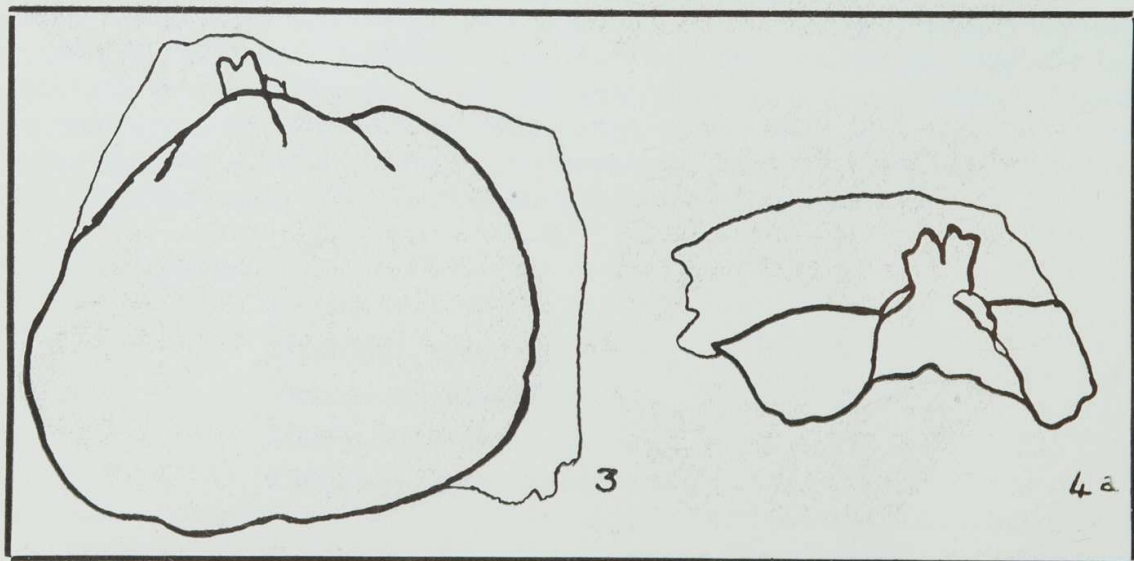
‡ See previous note, p. 48.

LIST OF ILLUSTRATIONS.

PLATE IV.

All figures natural size.

- Figs. 1a-c **Streptorhynchus luluigui**, n. sp., specimen 3040L, 1a, dorsal view, 1b ventral view, 1c side view.
- Figs. 2a-d **Streptorhynchus luluigui**, n. sp. Specimen $\frac{1}{5106}$ B, 2a dorsal view, dorsal valve fore-shortened by crushing, 2b ventral view, 2c side view, 2d looking down on area held in horizontal position to show true size and shape of area.
- Fig. 3 **Streptorhynchus luluigui**, n. sp. Specimen 2772.0. Dorsal valve from which posterior portion of shell has been removed showing impressions of the dental lamellae, the matrix above the shell shows the imprint of part of the cardinal process.
- Figs. 4a-b **Streptorhynchus luluigui**, n. sp., posterior portion of shell of specimen 2772.0. 4a seen from the internal surface showing the cardinal process and dental lamellae, 4b seen from the anterior showing the height of the dental lamellae and base of the cardinal process above the internal surface of the dorsal valve.
- Fig. 5 **Streptorhynchus luluigui**, n. sp. Area of ventral valve 2773G, intermediate between the extreme types shown by specimens 3040L and $\frac{1}{5106}$ B
- Fig. 6 **Streptorhynchus luluigui**, n. sp. Specimen 2772N. Posterior portion of cast of dorsal valve showing impressions of the dental lamellae.
- Fig. 7 **Streptorhynchus luluigui**, n. sp. Specimen I. Dorsal valve, shell removed from posterior portion showing slight median depression formed by low ridge between the two large rounded muscle impressions.



Owing to the difficulty of reproduction, figures 3 and 4a of Plate IV. do not show the outline of the cardinal process, so that it has been necessary to insert line drawings which are tracings from the original photographs.

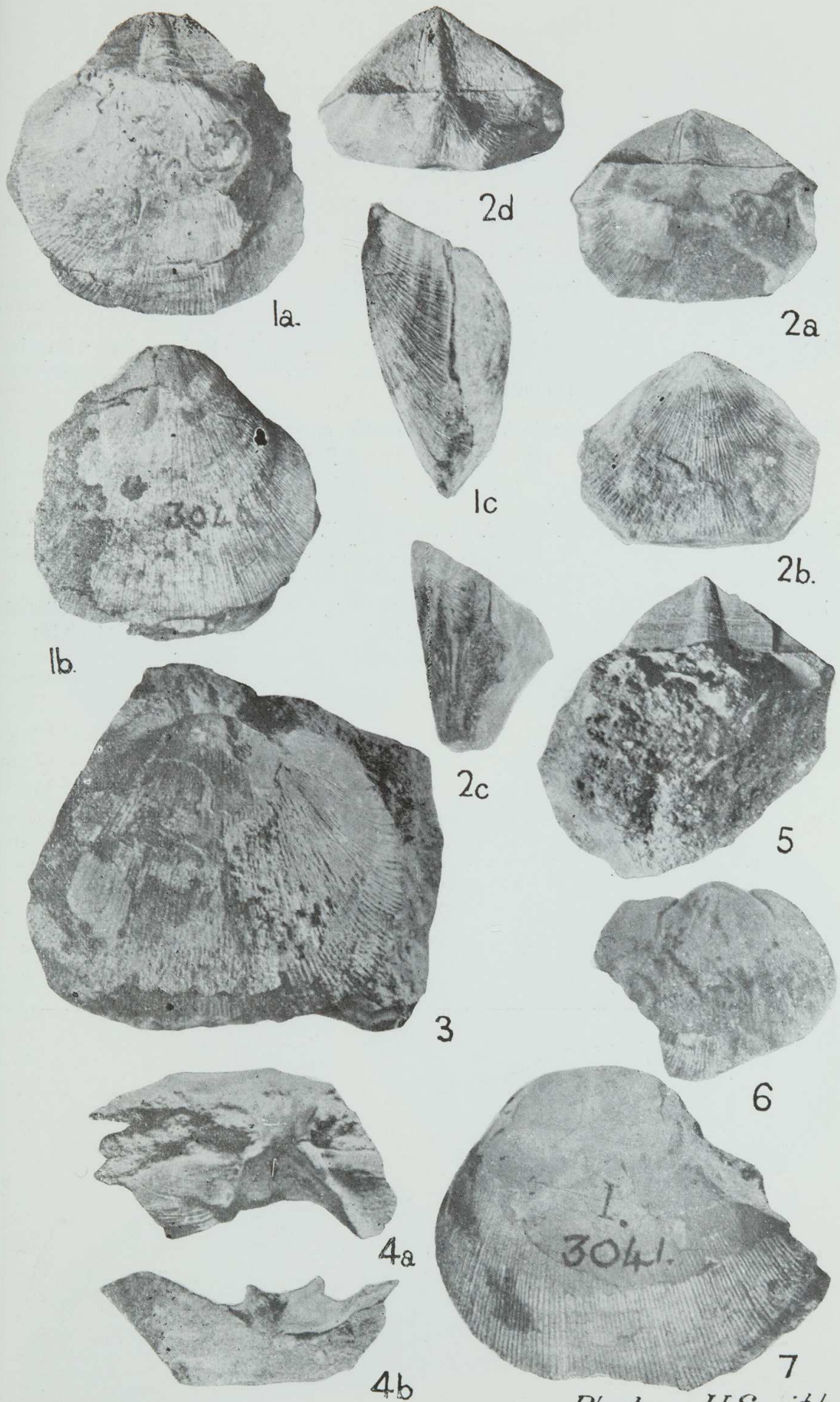


Photo. H. Smith.

Plate IV,

PLATE V.

All figures natural size, unless otherwise stated.

- Fig. 1 **Streptorhynchus luluigui**, n. sp. Cast of ventral valve 2773G, showing absence of median septum, faint elongated muscle impressions.
- Fig. 2 **Streptorhynchus luluigui**, n. sp. Ventral valve slightly convex type.
- Figs. 3 and 4 **Streptorhynchus luluigui**, n. sp. Ventral valves broader more flattened type. (Fig. 4 anterior margin of specimen broken away).
- Figs. 5a and b **Streptorhynchus plicatilis**, n. sp.—
5a, ventral view $\frac{11}{10}$ natural size.
5b, ventral valve showing area, hinge and interior, natural size.
- Fig. 6 *Derbyia* cf. *D. senilis*, Phil. Specimen figured in G.S.W.A. Bull. 58. Pl. VII., fig. 2. Ventral view showing median septum where umbo is worn away.
- Fig. 7 *Derbyia* cf. *D. senilis*, Phil. Posterior view of exfoliated dorsal valve showing impressions of the socket plates.

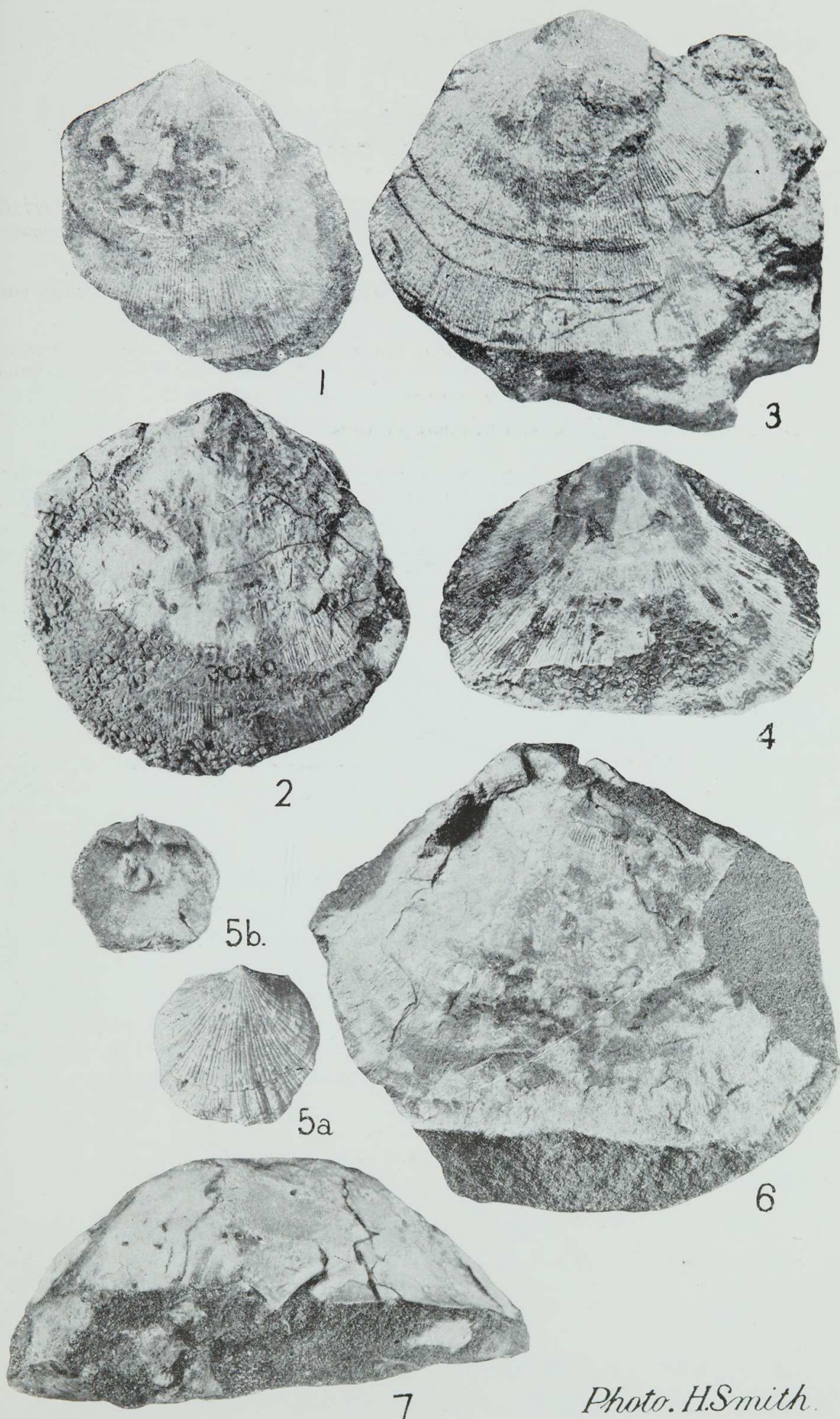


Photo. H. Smith.

Plate V.